

CLAIMS

1. An exposure method wherein a first surface of a light blocking member having a plurality of openings formed in a mutually adjoining relation is placed at an exposure object side, and wherein light is projected to the light blocking member from its second surface side so that exposure of the exposure object is carried out on the basis of near field light leaking from the openings, characterized in that:

interference is caused between surface plasmon polariton waves passing respectively through adjacent openings and going around to the first surface side, and that, on the basis of it, a portion having a decreased light intensity is produced in the exposure object so that the exposure is carried out by use of the decreased light intensity portion.

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2. A method according to Claim 1, wherein an optical latent image corresponding to a difference in contrast between the decreased light intensity portion and a portion where near field light leaks from the opening, is produced in the exposure object.

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3. A method according to Claim 1 or 2,
wherein the exposure object has a thickness which
is smaller than a distance between (i) a position
in the decreased light intensity portion where the
5 intensity with respect to a direction of normal to
the first surface is largest and (ii) an interface
between the first surface and the exposure object.

4. A device manufacturing method
10 characterized by:

an exposure step for exposing a
processing object in accordance with an exposure
method as recited in any one of Claims 1 - 3,
wherein the processing object comprises a
15 substrate to be processed and an exposure layer to
be exposed; and

a processing step of performing a
predetermined process to the processing object
having been exposed by said exposure step.
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5. A method according to Claim 4, wherein
said exposure step includes a process for
providing a buffer layer between the substrate of
the processing object and the exposure layer
25 thereof and for transferring an exposure pattern
formed on the exposure layer to the buffer layer.

6. An exposure mask comprising a light blocking member having a plurality of openings formed in a mutually adjoining relation, wherein a first surface of the light blocking member is placed at an exposure object side and wherein light is projected to the light blocking member from its second surface side so that exposure of the exposure object is carried out on the basis of near field light leaking from the openings, characterized in that:

interference is caused between surface plasmon polariton waves passing respectively through adjacent openings and going around to the first surface side, and that, on the basis of it, a portion having a decreased light intensity is produced in the exposure object so that the exposure is carried out by use of the decreased light intensity portion.

7. An exposure mask wherein exposure of an exposure object is carried out on the basis of near field light leaking from a plurality of openings provided in a light blocking member in a mutually adjoining relation, characterized in that:

the spacing between adjacent openings is not greater than the wavelength of light used

for the exposure, and that an end portion of the opening at the exposure object side has a structure effective to reduce scatter of a surface plasmon polariton wave going around to the exposure object side of the light blocking member.

8. An exposure mask according to Claim 7, wherein the end portion of the opening at the exposure object side has a curved surface shape.

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9. An exposure apparatus wherein a first surface of a light blocking member having a plurality of openings formed in a mutually adjoining relation is placed at an exposure object side, and wherein light is projected to the light blocking member from its second surface side so that exposure of the exposure object is carried out on the basis of near field light leaking from the openings, characterized in that:

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interference is caused between surface plasmon polariton waves passing respectively through adjacent openings and going around to the first surface side, and that, on the basis of it, a portion having a decreased light intensity is produced in the exposure object so that the exposure is carried out by use of the decreased light intensity portion.

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10. An exposure apparatus having light irradiation means and an exposure mask, wherein exposure of a processing object to be processed is carried out on the basis of near field light leaking from a plurality of openings provided in a mutually adjoining relation in a light blocking member of the exposure mask, characterized in that:

the wavelength of light used as the light irradiation means is longer than the spacing between adjacent openings of the light blocking member, and that an end portion of the opening at the processing object side is arranged to reduce scatter of a surface plasmon polariton wave going around to the processing object side of the light blocking member during the exposure.